Getting Ready

Content, community, structure, when to write, plan

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Course materials: `https://mmcheng.net/writing/`

2022/05/24

Table of Contents

Fig.: Sections 1-2.

Conditions for a good publication

Content + Style

- your great idea
- your advance in the subject.

Relationship between content and style

- Without content, style is irrelevant
- Even with a major break-through, your paper may still get rejected. *e.g.* The TIP example.
- High quality writing $\rightarrow$ the chance of acceptance.

Why do we need a paper?

Readers are interested in your
valuable discovery or **take-home message**,
rather than your **showoff**.

Key: novelty and originality

Originality in decreasing order $\downarrow$

- Find a new problem to solve.
- New approach to solve an existing problem.
- Put existing ideas together in a novel way, to solve some known problem.

Content

Your method should be an **improvement** in **some way**.

- Faster
- More accurate
- Less memory consumption
- . . .

Chose the way you wish to claim!

Exception

Negative results can also represent advances in knowledge. If they are unexpected.

- Most people familiar with the topic would expected to be better.
- But you have shown for some unforeseen reason that it is actually worse.

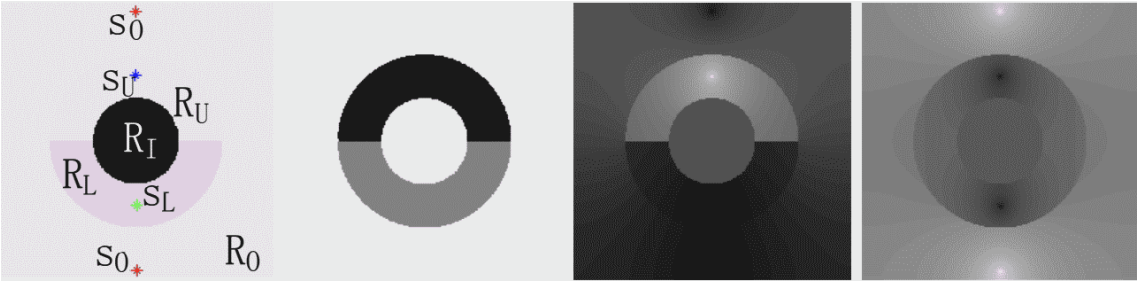


Fig.: Connectedness of Random Walk Segmentation, IEEE TPAMI 2011.

Put just one good idea in each paper!

- Even your main idea is brilliant, a reviewer can recommend rejection since you second idea is weak!
- You may not be able to fully describe, justify, and provide experimental supporting to your idea.
- I typically claim **no more than 2** contributions.

Find a new problem to solve

The problem must be

- sufficiently difficult, *i.e.* challenging.
- of use or interest to potential readers.

Finding a good new problem is tricky. *e.g.*

- Find human faces: not novel.
- Find snakes: probably too difficult, not very useful, too specific.

Find a new problem to solve

Fig.: Sketch2Photo: Internet Image Montage, ACM TOG 2009.

Find a new problem to solve

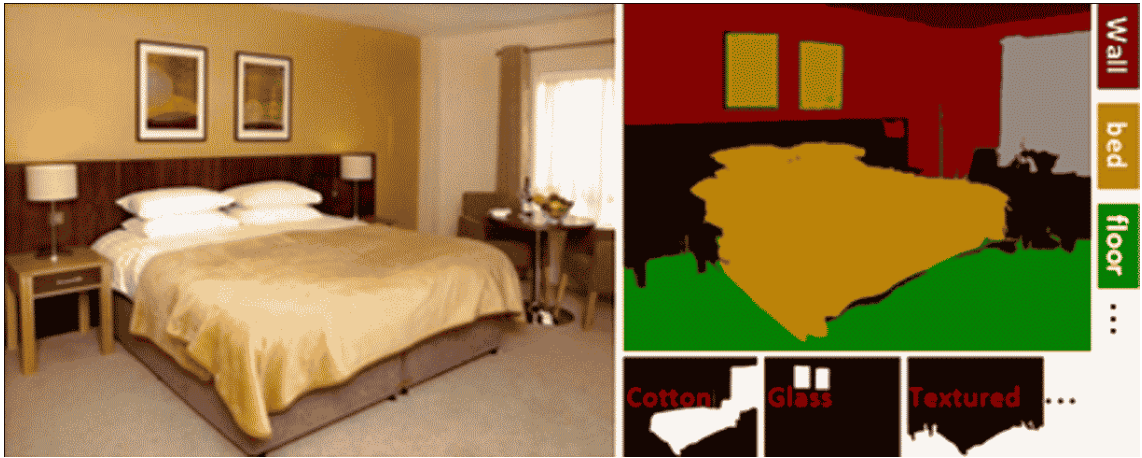
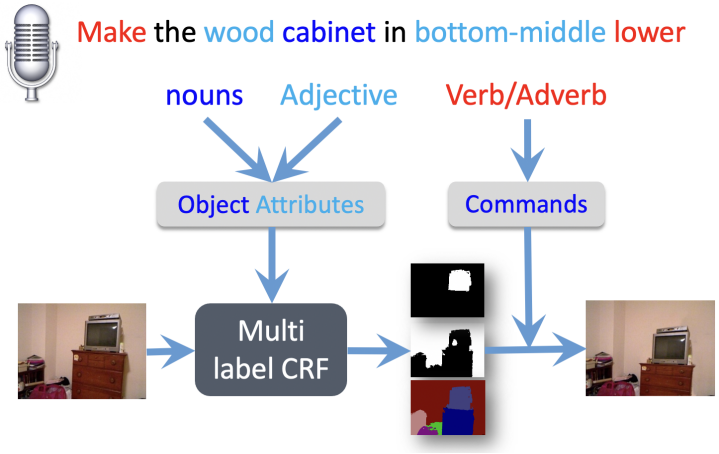


Fig.: ImageSpirit: Verbal Guided Image Parsing, ACM TOG 2014.

Find a new problem to solve



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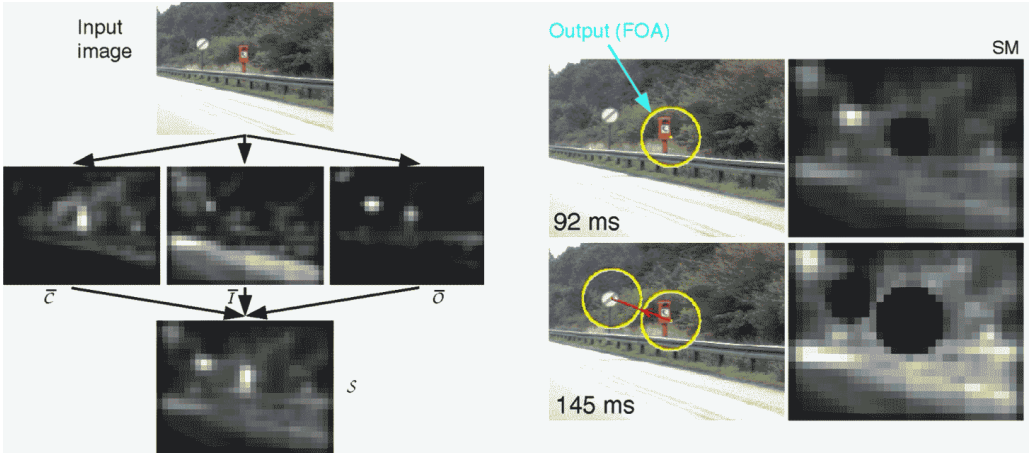
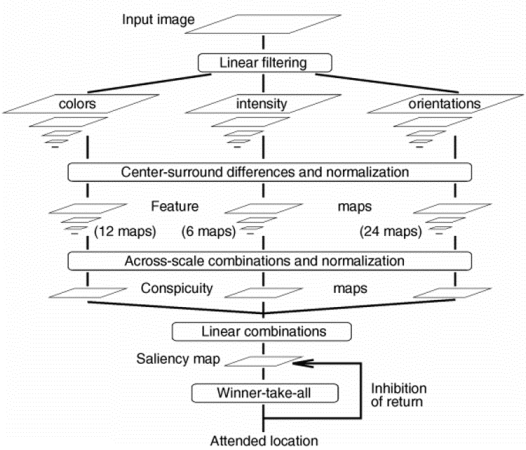


Fig.: A model of saliency-based visual attention for rapid scene analysis, IEEE TPAMI 1998.

Find a new problem to solve



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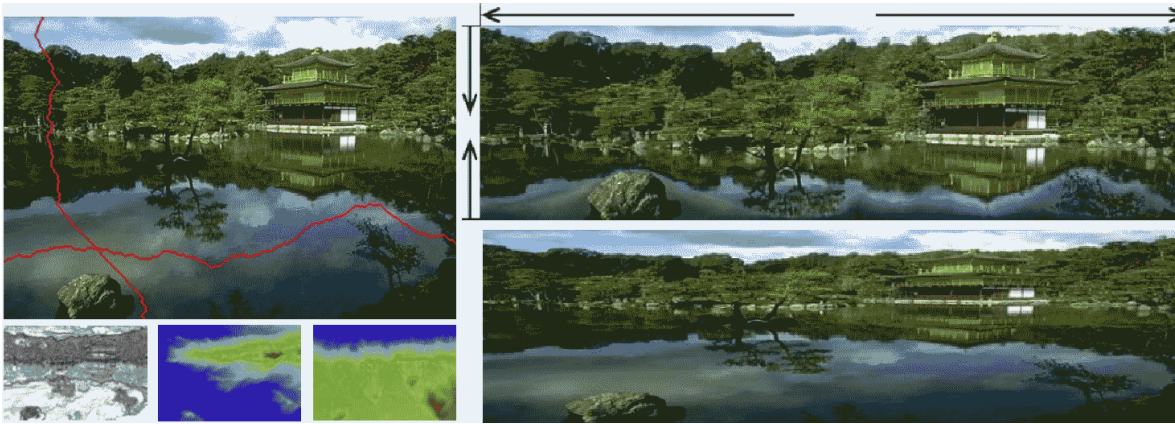


Fig.: Seam Carving for Content-Aware Image Resizing, ACM TOG 2007.

New approach to solve an existing problem

New approach to solve

- an existing problem.
- some step in a problem.

New approach to solve an existing problem

Fig.: Shape-Preserving Approach to Image Resizing, PG 2009.

New approach to solve an existing problem

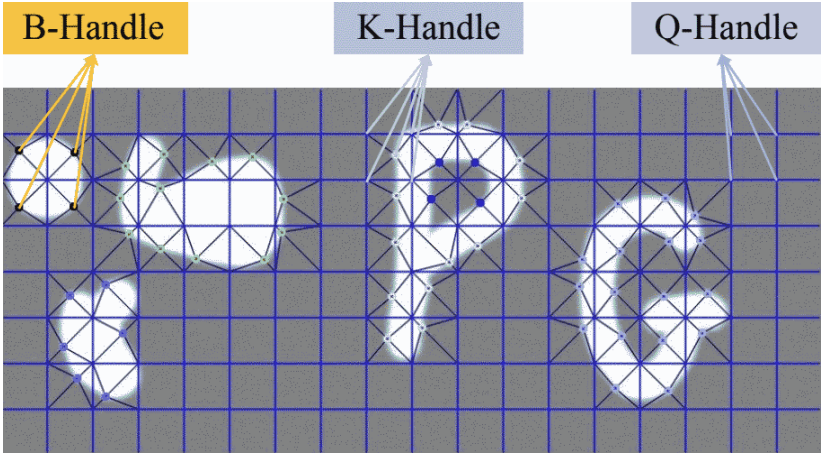


Fig.: Shape-Preserving Approach to Image Resizing, PG 2009.

New approach to solve an existing problem

A model of saliency-based visual attention for rapid scene analysis

L Itti, C Koch, E Niebur - IEEE Transactions on pattern analysis …, 1998 - ieeexplore.ieee.org

A **visual attention** system, inspired by the behavior and the neuronal architecture of the early primate **visual** system, is presented. Multiscale image features are combined into a single topographical saliency map. A dynamical neural network then selects attended locations in …

★ 99 Cited by 11314 Related articles All 45 versions

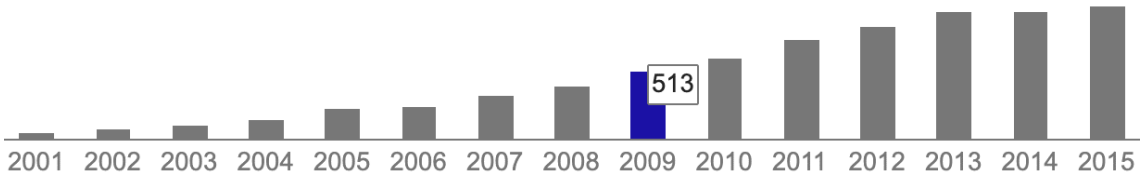


Fig.: A model of saliency-based visual attention for rapid scene analysis, IEEE TPAMI 1998.

New approach to solve an existing problem

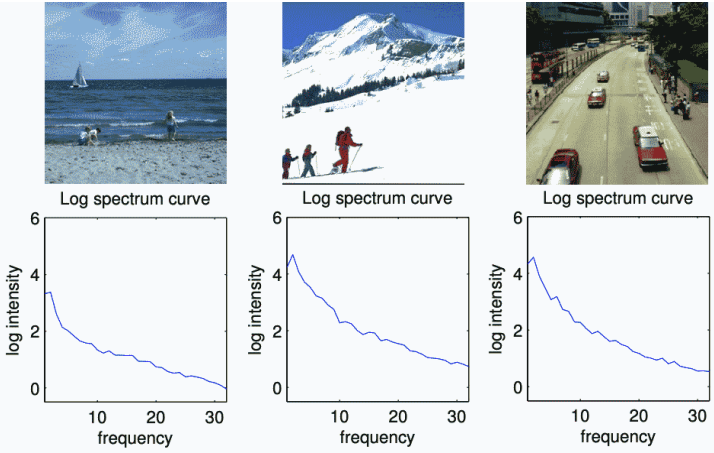
```
%% Read image from file
inImg = im2double(rgb2gray(imread('yourImage.jpg')));
inImg = imresize(inImg, 64/size(inImg, 2));

%% Spectral Residual
myFFT = fft2(inImg);
myLogAmplitude = log(abs(myFFT));
myPhase = angle(myFFT);
mySpectralResidual = myLogAmplitude - imfilter(myLogAmplitude, fspecial('average',
saliencyMap = abs(ifft2(exp(mySpectralResidual + i*myPhase))).^2;

%% After Effect
saliencyMap = mat2gray(imfilter(saliencyMap, fspecial('gaussian', [10, 10], 2.5)));
imshow(saliencyMap);
```

Fig.: Saliency Detection: A Spectral Residual Approach, IEEE CVPR 2007.

New approach to solve an existing problem



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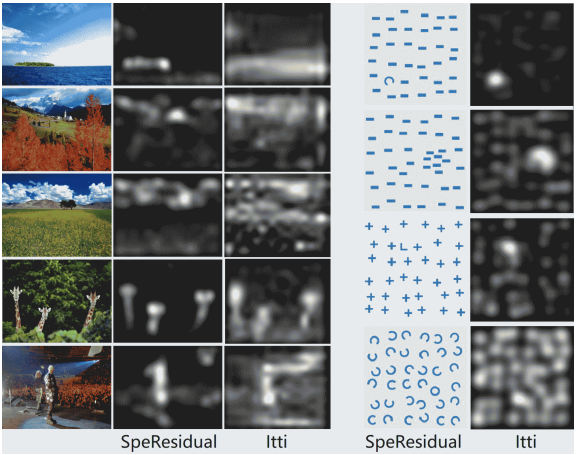

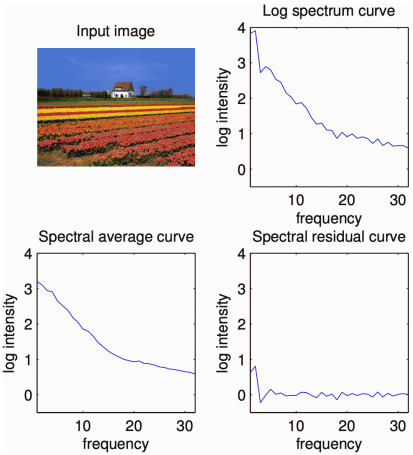

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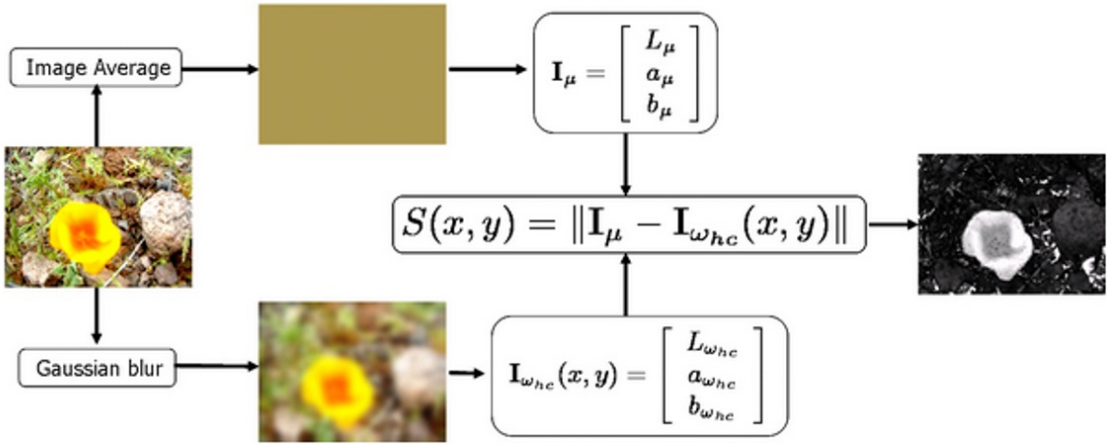


Fig.: Frequency-tuned Salient Region Detection, IEEE CVPR 2009.

New approach to solve an existing problem

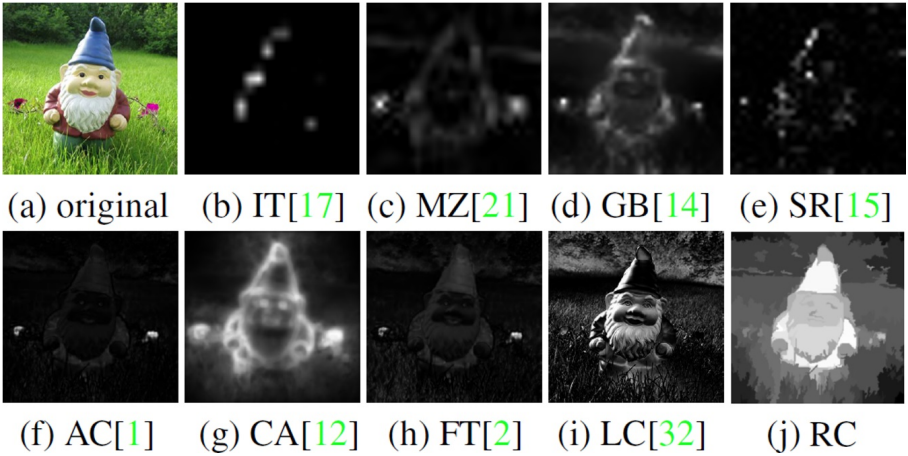
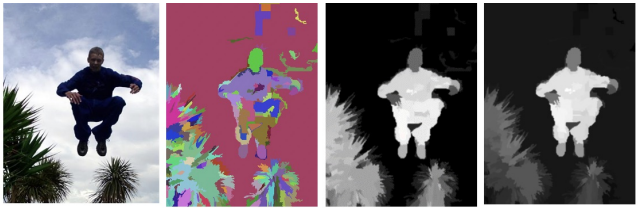


Fig.: Global Contrast based Salient Region Detection, IEEE TPAMI 2015 (CVPR 2011).

New approach to solve an existing problem



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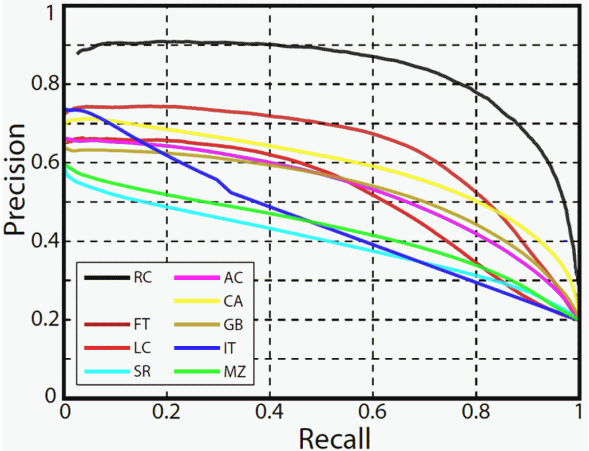

Fig.: Global Contrast based Salient Region Detection, IEEE TPAMI 2015 (CVPR 2011).

Combination innovation: put existing ideas together

The originality here would be

- the choice of suitable components.
- the way of linking these components together to meet an overall goal.

Should have some clever insight!

Combination innovation: put existing ideas together

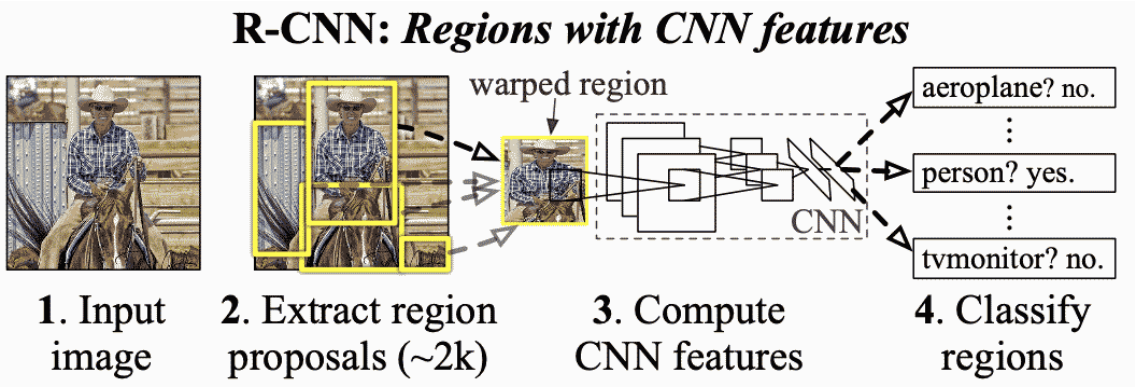

Fig.: Rich feature hierarchies for accurate object detection and semantic segmentation, IEEE CVPR 2014.

Combination innovation: put existing ideas together

Rich feature hierarchies for accurate object detection and semantic segmentation, IEEE CVPR 2014.

- To what extent do the CNN classification results on ImageNet generalize to object detection results on the PASCAL VOC Challenge?
- 2K category-independent region proposals $\rightarrow$ CNNs
- supervised pre-training on a large auxiliary dataset (ILSVRC), followed by domain- specific fine-tuning on a small dataset (PASCAL)

Very useful insights!

Combination innovation: put existing ideas together

VOC 2010 test	aero	bike	bird	boat	bottle	bus	...	sofa	train	tv	mAP
DPM v5 [18]†	49.2	53.8	13.1	15.3	35.5	53.4		20.7	43.8	38.3	33.4
UVA [34]	56.2	42.4	15.3	12.6	21.8	49.3		31.8	47.0	44.8	35.1
Regionlets [36]	65.0	48.9	25.9	24.6	24.5	56.1		32.6	54.0	45.9	39.7
SegDPM [16]†	61.4	53.4	25.6	25.2	35.5	51.7		35.0	52.8	43.1	40.4
R-CNN	67.1	64.1	46.7	32.0	30.5	56.4		38.1	52.8	50.2	50.2
R-CNN BB	**71.8**	**65.8**	**53.0**	**36.8**	**35.9**	**59.7**		**39.3**	**61.2**	**52.4**	**53.7**

Fig.: Rich feature hierarchies for accurate object detection and semantic segmentation, IEEE CVPR 2014.

Community and where to publish

Different fields have different unstated rules and expectations about:

- How a paper should be written?
- How to describe approaches?
- How to analyze results?
- ...

E.g. computer graphics, computer vision, or image processing.

Community and where to publish

IEEE TPAMI

The journal paper be a “substantial revision” ($\geq$30 percent) of the conference publication. Examples of the improvements: additional technical details, a clearer explanation of the contribution, more experiments if appropriate, or an updated state-of-the-art.

IEEE TIP

Clearly identifiable benefit that offers to the research community beyond the already published conference paper, *e.g.* additional analysis, novel algorithmic enhancements, added theoretical work, completeness of exposition, extensive experimental validation, etc.

Follow the expectations/style of a community

- Computational geometry paper typically have a theoretical analysis of how the performance scales with the quantity of input data, yet not practically testing their algorithms.
- Computer graphics papers emphasis on practical testing and quality of output.
- Computer vision paper typically pay more attention to benchmark results.
- ...

Graphics: SIGGRAPH $\leftrightarrow$ ACM TOG

CV: IEEE CVPR $\rightarrow$ IEEE TPAMI

CS community is special!

How to choose journals/conferences

- Evaluate relative quality of journals: impact factor, h5-index.
- Journals are less urgency, more likely to have reversion, more opportunity.

Employers assessing your research ability will often care where you publish more than your work itself!

Abstract and paper

- Publishers usually freely provide abstracts, wishing readers to pay before accessing the full paper.
- The abstract forms a **standalone**, **separate**, small document.
- The paper should not omit anything that is said in the abstract.

Paper structure

Header:

- Title
- Author list
- Author's affiliations and address
- Abstract
- Keywords

Paper structure

Body of paper:

- Introduction
- Related works
- Algorithms or Methods or Theoretical results
- Experiments or Proofs
- Conclusions (including possible future work)

Writing plan

- Write first draft fairly quickly and then revise it.
- Know what has already been explained earlier in the paper.
- Know what is still left to explain.
- Avoid write extensive detail and then find there is no space for it.
- Writing forces you to rethink about experiments: redo experiments or modify an algorithm.
- Cover everything that need saying, in enough detail, and then polish and shorten it during reversion.

Q & A?